IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BOARD OF PATENT APPEALS AND INTERFERENCES

In re patent application of:
Liu, et al.

Atty. Docket No.: YOR920030104US1

Serial No.: 10/674,334

Group Art Unit: 2145

Filed: September 30, 2003

Examiner: Liu, Lin

For: METHOD OF ESTABLISHING TRANSMISSION HEADERS FOR STATELESS GROUP COMMUNICATION

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' APPEAL BRIEF

Sirs:

Appellant respectfully appeals the final rejection of claims 1, 3-8, 10-15, 17-21, and 23-31, in the Office Action dated November 1, 2007. A Notice of Appeal was timely filed on February 1, 2008.

I. REAL PARTY IN INTEREST

The real party in interest is International Business Machines Corporation, Armonk, New York, assignee of 100% interest of the above-referenced patent application.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

III. STATUS OF CLAIMS

Claims 1, 3-8, 10-15, 17-21, and 23-31 are all the claims pending in the application and are under appeal. Claims 1, 3-8, 10-15, 17-21, and 23-31 stand rejected under 35 U.S.C. §112, first paragraph. Claims 1, 3-8, 10-15, 17-21, 23-31 stand rejected under 35 U.S.C. §112, second paragraph. Claims 1, 3-7, and 28 stand rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-8 of co-pending Application No. 10/674,335. Claims 8-27 and 29-31 stand rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 9-32 of co-pending Application No. 10/674,335. Claims 1, 4-8, 11-14, 21, 24-29, and 31 stand rejected under 35 U.S.C. §102(b) as being anticipated by Crawley, et al. (U.S. Patent No. 5,995,503), hereinafter referred to as Crawley. Claims 3, 10, 15, 17-20, 23, and 30 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Crawley, in view of Mittra (U.S. Patent No. 5,748,736). Claim 2, 9, 16, and 22 are cancelled. None of the claims are allowed; all of the rejections are appealed.

IV. STATUS OF AMENDMENTS

In response to the Office Action mailed November 1, 2007 (referred to herein as the "Office Action"), Appellants filed an after-final Amendment on December 28, 2007. An Advisory Action mailed on February 11, 2008 indicated that the Appellants'

December 28, 2007 amendments would be entered. The claims shown in the appendix are shown in their amended form as of the December 28, 2007 Amendment.

V. SUMMARY OF CLAIMED SUBJECT MATTER

One feature of the invention is a method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree. Claim 1 defines this feature as follows: "A method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The method described above allows maximum flexibility in specifying the routing path of individual data packets." This is shown in Figure 2.

Another feature of the invention is encoding the distribution tree to produce an encoded distribution tree. Claim 1 defines this feature as follows: "encoding said distribution tree to produce an encoded distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "the invention provides stateless group communication based on constructing and encoding sender based trees." This is shown in Figure 6.

Another feature of the invention is creating a header including the encoded distribution tree. Claim 1 defines this feature as follows: "creating a header including said encoded distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "The headers obtained by encoding the distribution trees are inserted in each communication packet." This is shown in Figure 6.

Another feature of the invention is adding the header to a data packet to be distributed to the distribution tree, wherein the nodes in the distribution tree lack group state information. Claim 1 defines this feature as follows: "adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information." This feature is described at various points in the

specification, for example paragraph [0040] describes this feature as follows: "The additional group communication header for stateless group communication reduces data payload of the packets proportional to the number of receivers." This is shown in Figure 4.

Another feature of the invention is modifying the header as the data packet is distributed down the distribution tree to remove encoded information concerning upper distribution levels of the distribution tree. Claim 1 defines this feature as follows: "modifying said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree." This feature is described at various points in the specification, for example paragraph [0038] describes this feature as follows: "it is possible to re-organize the subtree rooted at the current node such that a leaf node (n8) is promoted in the place of the current faulty node (n4), and the faulty node is skipped and removed from the tree as shown in Figure 3." This is shown in Figure 3.

Another feature of the invention is decoding a portion of the encoded distribution tree as a node receives the data packet and re-encoding the encoded distribution tree as the node passes the data packet to another node down the distribution tree. Claim 3 defines this feature as follows: "decoding a portion of said encoded distribution tree as a node receives said data packet and re-encoding said encoded distribution tree as said node passes said data packet to another node down said distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "The invention includes mechanisms for processing the encoded header at intermediate nodes in the distribution tree in order to determine the next communication nodes and mechanisms for modification and re-encoding of the trees in order to provide resilience to network failures or to react to application level specified conditions." This is shown in Figure 6.

Another feature of the invention is distribution tree controls the order in which the nodes receive the data packets. Claim 4 defines this feature as follows: "distribution tree controls the order in which said nodes receive said data packets." This feature is

described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The next hop connections are indexed based on the node identifier and entered in a routing hash table." This is shown in Figure 2.

Another feature of the invention is by controlling the order in which the nodes receive the data packets, the encoded distribution tree permits the nodes to process the data packets upon receipt. Claim 5 defines this feature as follows: "by controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt." This feature is described at various points in the specification, for example paragraph [0035] describes this feature as follows: "The invention checks to see if a faulty node is present, and the invention revises (repairs) the header to bypass the faulty nodes." This is shown in Figure 2.

Another feature of the invention is prior to the encoding process, creating the distribution tree at a sender node based upon a dynamic group of receiver nodes. Claim 6 defines this feature as follows: "prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes." This feature is described at various points in the specification, for example paragraph [0036] describes this feature as follows: "In case of many-to-many group communication (as in networked Virtual Environments) a server receives continuously messages from all receivers in the group, aggregates and sends them to the interested peers. The sender can infer in this case node or network faults from the failure to receive packets from receivers (assuming a minimum heartbeat frequency is required for group communication)." This is shown in Figure 2.

Another feature of the invention is encoding comprises sequentially entering addresses of nodes during a per-level traversal of the distribution tree starting from the root of the distribution tree. Claim 7 defines this feature as follows: "encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree." This feature is described at various points in the specification, for example paragraph [0029] describes this feature as follows: "The starting address of next hop nodes is (s[i]), i=1.k. The first entry of the new

header is the position of the next hop node in the address list. The rest of the header can be copied from the current node or modified by removing the entries from the tree encoding sequence and the addresses up to the current node." This is shown in Figure 1.

Another feature of the invention is a method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree. Claim 8 defines this feature as follows: "A method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The method described above allows maximum flexibility in specifying the routing path of individual data packets." This is shown in Figure 2.

Another feature of the invention is encoding the distribution tree to produce an encoded distribution tree. Claim 8 defines this feature as follows: "encoding said distribution tree to produce an encoded distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "the invention provides stateless group communication based on constructing and encoding sender based trees." This is shown in Figure 6.

Another feature of the invention is creating a header including the encoded distribution tree. Claim 8 defines this feature as follows: "creating a header including said encoded distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "The headers obtained by encoding the distribution trees are inserted in each communication packet." This is shown in Figure 6.

Another feature of the invention is adding the header to a data packet to be distributed to the distribution tree, wherein the nodes in the distribution tree lack group state information. Claim 8 defines this feature as follows: " adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information." This feature is described at various points in the specification, for example paragraph [0040] describes this feature as follows: "The

additional group communication header for stateless group communication reduces data payload of the packets proportional to the number of receivers." This is shown in Figure 4.

Another feature of the invention is processing the encoded distribution tree at each node of the nodes, thereby indicating to which node of the nodes the data packet should be next transferred. Claim 8 defines this feature as follows: "processing said encoded distribution tree at each node of said nodes, thereby indicating to which node of said nodes said data packet should be next transferred." This feature is described at various points in the specification, for example paragraph [0041] describes this feature as follows: "In item 500, the invention detaches the header from the data packet and in item 502 the invention processes the header to determine the K next hop nodes of the current node." This is shown in Figure 5.

Another feature of the invention is modifying the header as the data packet is distributed down the distribution tree to remove encoded information concerning upper distribution levels of the distribution tree. Claim 8 defines this feature as follows: "modifying said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree." This feature is described at various points in the specification, for example paragraph [0038] describes this feature as follows: "it is possible to re-organize the subtree rooted at the current node such that a leaf node (n8) is promoted in the place of the current faulty node (n4), and the faulty node is skipped and removed from the tree as shown in Figure 3." This is shown in Figure 3.

Another feature of the invention is decoding a portion of the encoded distribution tree as a node receives the data packet and re-encoding the encoded distribution tree as the node passes said data packet to another node down the distribution tree. Claim 10 defines this feature as follows: "decoding a portion of said encoded distribution tree as a node receives said data packet and re-encoding said encoded distribution tree as said node passes said data packet to another node down said distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes

this feature as follows: "The invention includes mechanisms for processing the encoded header at intermediate nodes in the distribution tree in order to determine the next communication nodes and mechanisms for modification and re-encoding of the trees in order to provide resilience to network failures or to react to application level specified conditions." This is shown in Figure 6.

Another feature of the invention is distribution tree controls the order in which the nodes receive the data packets. Claim 11 defines this feature as follows: "distribution tree controls the order in which said nodes receive said data packets." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The next hop connections are indexed based on the node identifier and entered in a routing hash table." This is shown in Figure 2.

Another feature of the invention is controlling the order in which the nodes receive the data packets, the encoded distribution tree permits the nodes to process the data packets upon receipt. Claim 12 defines this feature as follows: "controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt." This feature is described at various points in the specification, for example paragraph [0035] describes this feature as follows: "The invention checks to see if a faulty node is present, and the invention revises (repairs) the header to bypass the faulty nodes." This is shown in Figure 2.

Another feature of the invention is prior to the encoding process, creating the distribution tree at a sender node based upon a dynamic group of receiver nodes. Claim 13 defines this feature as follows: "prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes." This feature is described at various points in the specification, for example paragraph [0036] describes this feature as follows: "In case of many-to-many group communication (as in networked Virtual Environments) a server receives continuously messages from all receivers in the group, aggregates and sends them to the interested peers. The sender can infer in this case node or network faults from the failure to receive packets from receivers

(assuming a minimum heartbeat frequency is required for group communication)." This is shown in Figure 2.

Another feature of the invention is encoding comprises sequentially entering addresses of nodes during a per-level traversal of the distribution tree starting from the root of the distribution tree. Claim 14 defines this feature as follows: "encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree." This feature is described at various points in the specification, for example paragraph [0029] describes this feature as follows: "The starting address of next hop nodes is (s[i]), i=1.k. The first entry of the new header is the position of the next hop node in the address list. The rest of the header can be copied from the current node or modified by removing the entries from the tree encoding sequence and the addresses up to the current node." This is shown in Figure 1.

Another feature of the invention is a method of stateless group communication of data packets to nodes in a distribution tree. Claim 15 defines this feature as follows: "A method of stateless group communication of data packets to nodes in a distribution tree." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The method described above allows maximum flexibility in specifying the routing path of individual data packets." This is shown in Figure 2.

Another feature of the invention is encoding the distribution tree to produce an encoded distribution tree. Claim 15 defines this feature as follows: "encoding said distribution tree to produce an encoded distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "the invention provides stateless group communication based on constructing and encoding sender based trees." This is shown in Figure 6.

Another feature of the invention is creating a header including the encoded distribution tree. Claim 15 defines this feature as follows: "creating a header including said encoded distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "The

headers obtained by encoding the distribution trees are inserted in each communication packet." This is shown in Figure 6.

Another feature of the invention is adding the header to a data packet to be distributed to the distribution tree, wherein the nodes in the distribution tree lack group state information. Claim 15 defines this feature as follows: "adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information." This feature is described at various points in the specification, for example paragraph [0040] describes this feature as follows: "The additional group communication header for stateless group communication reduces data payload of the packets proportional to the number of receivers." This is shown in Figure 4.

Another feature of the invention is decoding a portion of the encoded distribution tree as a node of the nodes receives the data packet. Claim 15 defines this feature as follows: "decoding a portion of said encoded distribution tree as a node of said nodes receives said data packet." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "The encoding allows partial or full decoding of the distribution trees." This is shown in Figure 6.

Another feature of the invention is re-encoding the encoded distribution tree as the node passes the data packet to another node of the nodes down the distribution tree. Claim 15 defines this feature as follows: "re-encoding said encoded distribution tree as said node passes said data packet to another node of said nodes down said distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "The invention includes mechanisms for processing the encoded header at intermediate nodes in the distribution tree in order to determine the next communication nodes and mechanisms for modification and re-encoding of the trees in order to provide resilience to network failures or to react to application level specified conditions." This is shown in Figure 6.

Another feature of the invention is decoding and the re-encoding modify the header as the data packet is distributed down the distribution tree to remove encoded

information concerning upper distribution levels of the distribution tree. Claim 15 defines this feature as follows: "decoding and said re-encoding modify said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree." This feature is described at various points in the specification, for example paragraph [0038] describes this feature as follows: "it is possible to re-organize the subtree rooted at the current node such that a leaf node (n8) is promoted in the place of the current faulty node (n4), and the faulty node is skipped and removed from the tree as shown in Figure 3." This is shown in Figure 3.

Another feature of the invention is distribution tree controls the order in which the nodes receive the data packets. Claim 17 defines this feature as follows: "distribution tree controls the order in which said nodes receive said data packets." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The next hop connections are indexed based on the node identifier and entered in a routing hash table." This is shown in Figure 2.

Another feature of the invention is by controlling the order in which the nodes receive the data packets, the encoded distribution tree permits the nodes to process the data packets upon receipt. Claim 18 defines this feature as follows: "controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt." This feature is described at various points in the specification, for example paragraph [0035] describes this feature as follows: "The invention checks to see if a faulty node is present, and the invention revises (repairs) the header to bypass the faulty nodes." This is shown in Figure 2.

Another feature of the invention is prior to the encoding process, creating the distribution tree at a sender node based upon a dynamic group of receiver nodes. Claim 19 defines this feature as follows: "prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes." This feature is described at various points in the specification, for example paragraph [0036] describes this feature as follows: "In case of many-to-many group communication (as in networked Virtual Environments) a server receives continuously messages from all

receivers in the group, aggregates and sends them to the interested peers. The sender can infer in this case node or network faults from the failure to receive packets from receivers (assuming a minimum heartbeat frequency is required for group communication)." This is shown in Figure 2.

Another feature of the invention is encoding comprises sequentially entering addresses of nodes during a per-level traversal of the distribution tree starting from the root of the distribution tree. Claim 20 defines this feature as follows: "encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree." This feature is described at various points in the specification, for example paragraph [0029] describes this feature as follows: "The starting address of next hop nodes is (s[i]), i=1.k. The first entry of the new header is the position of the next hop node in the address list. The rest of the header can be copied from the current node or modified by removing the entries from the tree encoding sequence and the addresses up to the current node." This is shown in Figure 1.

Another feature of the invention is a method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree. Claim 21 defines this feature as follows: "A method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The method described above allows maximum flexibility in specifying the routing path of individual data packets." This is shown in Figure 2.

Another feature of the invention is encoding the distribution tree to produce an encoded distribution tree. Claim 21 defines this feature as follows: "encoding said distribution tree to produce an encoded distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "the invention provides stateless group communication based on constructing and encoding sender based trees." This is shown in Figure 6.

Another feature of the invention is creating a header including the encoded distribution tree. Claim 21 defines this feature as follows: "creating a header including said encoded distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "The headers obtained by encoding the distribution trees are inserted in each communication packet." This is shown in Figure 6.

Another feature of the invention is adding the header to a data packet to be distributed to the distribution tree, wherein the nodes in the distribution tree lack group state information. Claim 21 defines this feature as follows: "adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information." This feature is described at various points in the specification, for example paragraph [0040] describes this feature as follows: "The additional group communication header for stateless group communication reduces data payload of the packets proportional to the number of receivers." This is shown in Figure 4.

Another feature of the invention is modifying the header as the data packet is distributed down the distribution tree to remove encoded information concerning upper distribution levels of the distribution tree. Claim 21 defines this feature as follows: "modifying said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree." This feature is described at various points in the specification, for example paragraph [0038] describes this feature as follows: "it is possible to re-organize the subtree rooted at the current node such that a leaf node (n8) is promoted in the place of the current faulty node (n4), and the faulty node is skipped and removed from the tree as shown in Figure 3." This is shown in Figure 3.

Another feature of the invention is decoding a portion of the encoded distribution tree as a node receives the data packet and re-encoding the encoded distribution tree as the node passes the data packet to another node down the distribution tree. Claim 23 defines this feature as follows: "decoding a portion of said encoded distribution tree as a

node receives said data packet and re-encoding said encoded distribution tree as said node passes said data packet to another node down said distribution tree." This feature is described at various points in the specification, for example paragraph [0043] describes this feature as follows: "The invention includes mechanisms for processing the encoded header at intermediate nodes in the distribution tree in order to determine the next communication nodes and mechanisms for modification and re-encoding of the trees in order to provide resilience to network failures or to react to application level specified conditions." This is shown in Figure 6.

Another feature of the invention is distribution tree controls the order in which the nodes receive the data packets. Claim 24 defines this feature as follows: "distribution tree controls the order in which said nodes receive said data packets." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The next hop connections are indexed based on the node identifier and entered in a routing hash table." This is shown in Figure 2.

Another feature of the invention is by controlling the order in which the nodes receive the data packets, the encoded distribution tree permits the nodes to process the data packets upon receipt. Claim 25 defines this feature as follows: "by controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt." This feature is described at various points in the specification, for example paragraph [0035] describes this feature as follows: "The invention checks to see if a faulty node is present, and the invention revises (repairs) the header to bypass the faulty nodes." This is shown in Figure 2.

Another feature of the invention is prior to the encoding process, creating the distribution tree at a sender node based upon a dynamic group of receiver nodes. Claim 26 defines this feature as follows: "prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes." This feature is described at various points in the specification, for example paragraph [0036] describes this feature as follows: "In case of many-to-many group communication (as in networked Virtual Environments) a server receives continuously messages from all

receivers in the group, aggregates and sends them to the interested peers. The sender can infer in this case node or network faults from the failure to receive packets from receivers (assuming a minimum heartbeat frequency is required for group communication)." This is shown in Figure 2.

Another feature of the invention is encoding comprises sequentially entering addresses of nodes during a per-level traversal of the distribution tree starting from the root of the distribution tree. Claim 27 defines this feature as follows: "encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree." This feature is described at various points in the specification, for example paragraph [0029] describes this feature as follows: "The starting address of next hop nodes is (s[i]), i=1.k. The first entry of the new header is the position of the next hop node in the address list. The rest of the header can be copied from the current node or modified by removing the entries from the tree encoding sequence and the addresses up to the current node." This is shown in Figure 1.

Another feature of the invention is lack of the group state information reduces a signaling of a control path and adds flexibility of dynamic modification of the communication trees. Claim 28 defines this feature as follows: "lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The invention can also cache active routes for efficient data forwarding. The method described above allows maximum flexibility in specifying the routing path of individual data packets." This is shown in Figure 2.

Another feature of the invention is lack of the group state information reduces a signaling of a control path and adds flexibility of dynamic modification of the communication trees. Claim 29 defines this feature as follows: "lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The

invention can also cache active routes for efficient data forwarding. The method described above allows maximum flexibility in specifying the routing path of individual data packets." This is shown in Figure 2.

Another feature of the invention is lack of the group state information reduces a signaling of a control path and adds flexibility of dynamic modification of the communication trees. Claim 30 defines this feature as follows: "lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The invention can also cache active routes for efficient data forwarding. The method described above allows maximum flexibility in specifying the routing path of individual data packets." This is shown in Figure 2.

Another feature of the invention is lack of the group state information reduces a signaling of a control path and adds flexibility of dynamic modification of the communication trees. Claim 31 defines this feature as follows: "lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees." This feature is described at various points in the specification, for example paragraph [0034] describes this feature as follows: "The invention can also cache active routes for efficient data forwarding. The method described above allows maximum flexibility in specifying the routing path of individual data packets." This is shown in Figure 2.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The issues presented for review is whether claims 1, 4-8, 11-14, 21, 24-29, and 31 are anticipated under 35 U.S.C. §102(b) by Crawley, whether claims 3, 10, 15, 17-20, 23, and 30 are unpatentable under 35 U.S.C. §103(a) by Crawley, in view of Mittra, whether claims 1, 3-7, and 28 are unpatentable under non-statutory obviousness-type double patenting over claims 1-8 of co-pending Application No. 10/674, 335, and whether

claims 8-27 and 29-31 are unpatentable under non-statutory obviousness-type double patenting over claims 9-32 of co-pending Application No. 10/674, 335.

VII. ARGUMENT

A. The 35 U.S.C. §112, First Paragraph, Rejection

1. The Position in the Office Action

The Office Action states:

Claims 1, 3-8, 10-15,17-21 and 23-31 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicant has amended the claims to add the additional limitation: "wherein said nodes in said distribution tree lack group state information", which is not explicitly found in the specification. Applicant has not pointed out wherein the specification support can be found for the limitation. All of the other dependent claims are rejected for the same reason.

2. Appellants' Position

Claims 1, 3-8, 10-15, 17-21, and 23-31 stand rejected under 35 U.S.C. §112, first paragraph. Specifically, the Office Action asserts that the claim limitation "wherein said nodes in said distributed tree lack group state information" is not found in the specification (Office Action, p. 2, item 3). Appellants respectfully disagree and submit that Appellants' disclosure discusses stateless group communication between the nodes of the distribution tree.

More specifically, as described in paragraph 0018 of Appellants' disclosure, some protocols maintain state information at the nodes involved in a group communication session. However, the invention provides group communication by fully encoding communication trees at the sender to allow stateless operation. One of the advantages of

stateless group communication comes from reducing the signaling of the control path. The second is the added flexibility of dynamic modification of communication trees.

Moreover, as described in paragraph 0023 of Appellants' disclosure, in order to perform application level forwarding without maintaining group communication states at intermediate nodes participating in the forwarding, the full distribution tree is encoded at the sender and included in each transmitted packet.

Accordingly, Appellants' disclosure discusses stateless group communication between the nodes of the distribution tree. In view of the foregoing, the Board is respectfully requested to postpone decision this rejection.

B. The 35 U.S.C. §112, Second Paragraph, Rejection

1. The Position in the Office Action

The Office Action states:

Claims 1, 3-8, 10-15,17-21 and 23-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Applicant has amended the claims to add the additional limitation: "wherein said nodes in said distribution tree lack group state information", which is a negative limitation that rendered the claims indefinite (See MPEP 2173.05 (i) Negative Limitations section).

2. Appellants' Position

Claims 1, 3-8, 10-15, 17-21, 23-31 stand rejected under 35 U.S.C. §112, second paragraph. More specifically, the Office Action asserts that the claim limitation "wherein said nodes in said distributed tree lack group state information" is a negative limitation that renders the claims indefinite. Appellants respectfully disagree.

As provided in MPEP 2173.05(i), the current view of the courts is that there is nothing inherently ambiguous or uncertain about a negative limitation. So long as the boundaries of the patent protection sought are set forth definitely, albeit negatively, the claim complies with the requirements of 35 U.S.C. 112, second paragraph.

As further provided in MPEP 2173.05(i), a claim which recited the limitation "said homopolymer being free from the proteins, soaps, resins, and sugars present in natural Hevea rubber" in order to exclude the characteristics of the prior art product, was considered definite because each recited limitation was definite. *In re Wakefield*, 422 F.2d 897, 899, 904, 164 USPQ 636, 638, 641 (CCPA 1970). In addition, the court found that the negative limitation "incapable of forming a dye with said oxidized developing agent" was definite because the boundaries of the patent protection sought were clear. *In re Barr*, 444 F.2d 588, 170 USPQ 330 (CCPA 1971).

Appellants submit that the boundaries of the patent protection sought are set forth definitely, albeit negatively. Specifically, the claimed invention provides the positive method step of "adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information" (independent claims 1, 8, 15, and 21). As such, it is Appellants' position that the claim complies with the requirements of 35 U.S.C. 112, second paragraph. In view of the foregoing, the Board is respectfully requested to postpone decision this rejection.

C. The Double Patenting Rejection

1. The Position in the Office Action

The Office Action states:

Claims 1, 3-7 and 28 are provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-8 of co-pending Application No. 10/674335. Although the conflicting claims are not identical, they are not patentably distinct from each other because:

the limitation "modifying said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree." recited 01') the present application is substantially the same as the limitation "modifying said header as said data packet is distributed down said distribution tree to repair said distribution tree." recited on the co-pending application #: 10/674335.

Claims 8, 9-27, 29-31 are provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 9-32 of co-pending Application No. 10/674335 in view of Auerbach et al. (patent no.: US 5,355,371).

The instant claims of the present application do not explicitly disclose detecting failed nodes and remove the failed nodes. However, Auerbach discloses detecting failed nodes and remove failed nodes (Auerbach, col. 10, lines 18-34, noted that the Tree leader recognizes the possible node failure and remove them from the tree).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to modify the instant claims of the present invention to include the feature of detecting failed nodes and removing the failed node as taught by Auerbach with motivation being that it provides better quality of service in delivering packets from one node to another.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

2. Appellants' Position

Claims 1, 3-7, and 28 stand rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-8 of co-pending Application No. 10/674,335. Claims 8-27 and 29-31 stand rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 9-32 of co-pending Application No. 10/674,335. When the present application and/or the copending applications are allowed, Appellants will file a terminal disclaimer in the allowed application(s) in regards to the other application(s). In view of the foregoing, the Board is respectfully requested to postpone decision this rejection.

D. The Rejection Based on Crawley

1. The Position in the Office Action

The Office Action states:

Claims 1, 4-8, 11-14, 21, 24-29, and 31 are rejected under 35 U.S.C. 102(b) as being anticipated by Crawley et al. (Patent no. US 5,995,503).

With respect to claim 1, Crawley teaches a method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree (Crawley, figures 11 and 12), said method comprising:

encoding said distribution tree to produce an encoded distribution tree (Crawley, col. 10, lines 48-60 and col. 11, lines 1-8, noted that distribution tree is encoded);

creating a header including said encoded distribution tree (Crawley, col. 10, lines 38-60, noted that an Explicit Routing Advertisement (ERA) header); and

adding said header to a data packet to be distributed to said distribution tree (Crawley, fig. 11, col. 10, lines 38-45, noted that ERA header is encapsulated in the ERA 252 information),

wherein said nodes in said distribution tree lack group state information (Crawley: abstract, col. 1, lines 12-29, and col. 2, lines 34-45); and

modifying said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree (Crawley, col. 10 lines 30-37, and col. 11 line 61 to col. 12 line 8, noted that the ERA header is adjusted as the ERA data is distributed to other hops in the network.).

With respect to claim 4, Crawley teaches the method in claim 1, wherein said distribution tree controls the order in which said nodes receive said data packets (Crawley, col. 10, line 61 to col. 11, line 8, noted that the node is constructed in order).

Consider claim 5, Crawley teaches the method in claim 4, wherein by controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt (Crawley, col. 11 ,lines 3-15, noted that the first hop router performs the path calculations).

With respect to claim 6, Crawley teaches the method in claim 1, further comprising, prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes (Crawley, col. 10, lines 56-59).

With respect to claim 7, Crawley teaches the method in claim 1, wherein said encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree (Crawley, col. 11, lines 1-8, noted that the routers are arranged in sequentially order).

With respect to claim 8, Crawley, teaches a method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree (Crawley, figures 11 and12), said method comprising:

encoding said distribution tree to produce an encoded distribution tree (Crawley, col. 10, lines 48-60 and col. 11, lines 1-8, noted that distribution tree is encoded);

creating a header including said encoded distribution tree (Crawley, col. 10, lines 38-60, noted that an Explicit Routing Advertisement (ERA) header); and

adding said header to a data packet to be distributed to said distribution tree (Crawley, fig. 11, col. 10, lines 38-45, noted that ERA header is encapsulated in the ERA 252 information),

wherein said nodes in said distribution tree lack group state information (Crawley: abstract, col. 1, lines 12-29, and col. 2, lines 34-45);

processing said encoded distribution tree at each node of said nodes, thereby indicating to which node of said nodes said data packet should be next transferred (Crawley, col. 10, line 61 to col. 11, line 8, noted that the process of encoding the distribution tree is traversed down the tree in a preorder arrangement of the node); and

modifying said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree (Crawley, col. 10 lines 30-37, and col. 11 line 61 to col. 12 line 8, noted that the ERA header is adjusted as the ERA data is distributed to other hops in the network.).

With respect to claim 11 the limitations of this claim are substantially the same as those in claim 4. Therefore the same rationale for rejecting claim 4 is used to reject claim 11. By this rationale claim 11 is rejected.

With respect to claim 12 the limitations of this claim are substantially the same as those in claim 5. Therefore the same rationale for rejecting claim 5 is used to reject claim 12. By this rationale claim 12 is rejected.

With respect to claim 13 the limitations of this claim are substantially the same as those in claim 6. Therefore the same rationale for rejecting claim 6 is used to reject claim 13. By this rationale claim 13 is rejected.

With respect to claim 14 the limitations of this claim are substantially the same as those in claim 7. Therefore the same rationale for rejecting claim 7 is used to reject claim 14. By this rationale claim 14 is rejected.

Claim 21 lists all the same elements of claim 1, but in computer program instructions form rather than method form. Therefore, the supporting rationale of the rejection to claim 1 applies equally as well to claim 21.

With respect to claim 22 the limitations of this claim are substantially the same as those in claim 2. Therefore the same rationale for rejecting claim 2 is used to reject claim 22. By this rationale claim 22 is rejected.

With respect to claim 24 the limitations of this claim are substantially the same as those in claim 4. Therefore the same rationale for rejecting claim 4 is used to reject claim 24. By this rationale claim 24 is rejected.

With respect to claim 25 the limitations of this claim are substantially the same as those in claim 5. Therefore the same rationale for rejecting claim 5 is used to reject claim 25. By this rationale claim 25 is rejected.

With respect to claim 26 the limitations of this claim are substantially the same as those in claim 6. Therefore the same rationale for rejecting claim 6 is used to reject claim 26. By this rationale claim 26 is rejected.

With respect to claim 27 the limitations of this claim are substantially the same as those in claim 7. Therefore the same rationale for rejecting claim 7 is used to reject claim 27. By this rationale claim 27 is rejected.

With respect to claim 28, Crawley teaches the program storage device in claim 21, wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees (Crawley: col. 1, lines 30-54).

With respect to claim 29 the limitations of this claim are substantially the same as those in claim 28. Therefore the same rationale for rejecting claim 28 is used to reject claim 29. By this rationale claim 29 is rejected.

With respect to claim 31 the limitations of this claim are substantially the same as those in claim 28. Therefore the same rationale for rejecting claim 28 is used to reject claim 31. By this rationale claim 31 is rejected.

Response to Arguments

Applicant's arguments filed on 08/16/2007 have been fully considered but they are not persuasive.

In response to applicant's argument that the "ERA header" of Crawley does not include an encoded distribution tree. Rather, the encoded distribution tree in Crawley is positioned in the "body" of the ERA." The examiner disagrees.

The "encoding of a distribution tree" recited in the present claim is not a physical or viewable tree; rather it is a mechanism of encoding a data routing path, which is applied/included to process the header of a data packet. Similarly, in the analogous art of Crawley, he teaches generating an Explicit Routing Advertisement (ERA) data packet containing the calculated distribution tree of data routing information (Crawley, col. 9, lines 55-65 and col. 10, lines 56-60). This teaching is equivalent to processing of the ERA data header. Thus meeting the scope of the claimed limitations as presently recited.

In response to applicant's argument that "Furthermore, the ERA header of Crawley is not added to a data packet to be distributed to the distribution tree." The examiner disagrees. Crawley explicitly teaches generating an Explicit Routing

Advertisement (ERA) data packet containing forwarding information and ERA data (Crawley: fig. 11) is distributed to other routers in the network. (Crawley: col. 9, lines 55-65 and col. 10, lines 30-37).

In response to applicant's arguments, the recitation "In addition, the prior art of record does not teach or suggest "stateless" group communication." has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See In re Hirao, 535 F.2d 67, 190 USPQ 15 (CCPA 1976) and Kropa v. Robie, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

In addition, in response to applicant's argument that "In addition, the prior art of record does not teach or suggest "stateless" group communication." The examiner disagrees. Crawley explicitly teaches a connectionless network having multiple nodes (Crawley: abstract).

In response to applicant's newly added claims 28-31 that "wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees.", a recitation of the intended use of the claimed invention must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim.

2. Appellants' Position

a. Independent Claims 1, 8, and 21

In the rejection, the Office Action argues that Crawley discloses many features of the claimed invention. However, the “ERA header” of Crawley (which the Office Action asserts teaches the “header” of the claimed invention) does not include an encoded distribution tree. Rather, the encoded distribution tree in Crawley is positioned in the

"body" of the ERA. In addition, Crawley does not teach or suggest "stateless" group communication. Instead, Crawley teaches "stateful" group communication, wherein each node/router within the network includes information regarding the node/router topology of the network. Therefore, as explained in greater detail below, Appellants respectfully submit that Crawley does not disclose the claimed invention.

Appellants traverse the rejections because Crawley fails to disclose the claimed features of "creating a header including said encoded distribution tree; [and] adding said header to a data packet to be distributed to said distribution tree". Such features are defined in independent claims 1, 8, and 21 using identical language.

First of all, the Office Action argues that the "explicit routing advertisement (ERA) header" of Crawley teaches the "header" of the claimed invention (Office Action, p. 8, item 12). However, unlike the "header" of the claimed invention, the "ERA header" of Crawley does not include an encoded distribution tree (independent claims 1, 8, 15, and 21). Instead, in Crawley, the encoded distribution tree is positioned in the "body" of the ERA. As explicitly stated in column 10, lines 51-53, of Crawley "[t]he adjust offset and child offset fields are used to encode the distribution tree into the ERA ***body***" (emphasis added).

Furthermore, nothing within Crawley teaches or suggests that the ERA header (or the ERA body) is added to a data packet to be distributed to the distribution tree (independent claims 1, 8, and 21). Although the ERA header of Crawley "contains information that identifies a particular data flow" (Crawley, col. 10, lines 43-44), the ERA header is not added to a data packet. In Crawley, data packets do not require information from the ERA headers regarding the routing path. This is because the routing path has already been established *prior* to the initiation of the data flow in Crawley.

To the contrary, as described in paragraph 0007 of Appellants' disclosure, the invention establishes transmission headers for stateless group communication of data packets to nodes by encoding a distribution tree, creating a header that includes the encoded distribution tree, and adding the header to the data packets to be distributed to

the distribution tree. The invention creates the distribution tree at a sender node based the knowledge of the addresses of receiver nodes. The encoding process comprises sequentially entering addresses of nodes during a per-level traversal of the distribution tree starting from the root of the distribution tree.

As further described in paragraph 0008 of Appellants' disclosure, the methodology modifies the header as the data packet is distributed down the distribution tree to remove encoded information concerning upper distribution levels of the tree. Thus, the invention decodes a portion of the encoded distribution tree as each node receives the data packet and re-encodes the distribution tree as the node passes the data packet to another node down the distribution tree. The distribution tree controls the order in which the nodes receive the data packets. Thus, by controlling the order in which the nodes receive the data packets, the encoding of the distribution tree permits the nodes to process the data packets in an order specified by the tree hierarchy. The invention processes the encoded header containing the distribution tree at each node, thereby indicating to which node the data packet should be next transferred.

Accordingly, Appellants submit that the "ERA header" of Crawley (which the Office Action asserts teaches the "header" of the claimed invention) does not include an encoded distribution tree. Rather, the encoded distribution tree in Crawley is positioned in the "body" of the ERA. Further unlike the claimed invention, the ERA header of Crawley is not added to a data packet to be distributed to the distribution tree. Instead, the data packets of Crawley do not require information from the ERA headers regarding the routing path. Therefore, it is Appellants' position that Crawley fails to disclose the claimed features of "creating a header including said encoded distribution tree; [and] adding said header to a data packet to be distributed to said distribution tree" as defined in independent claims 1, 8, and 21.

In addition, Appellants traverse the rejections because Crawley fails to teach the claimed features "wherein said nodes in said distribution tree lack group state information". Such features are defined in independent claims 1, 8, and 21 using identical language.

Appellants submit that Crawley does not teach "stateless" group communication. Instead, Crawley discloses "stateful" group communication, wherein each node/router within the network includes information regarding the node/router topology of the network. More specifically, as described in column 6, paragraph 2, of Crawley, the routing procedures provided by the present invention may be used with "link state routing protocols". As further described in column 1, paragraphs 3-4, of Crawley, link state routing protocols are used to advertise the existence of various connections (or links) in a network. By advertising the existence of network links to other nodes (or routers) in a network, each router learns the topology of the network. An example of a link-state routing protocol is the Open Shortest Path First (OSPF) routing protocol. Each router running the OSPF protocol maintains an identical database describing the network topology. Using this topology database, each router is able to generate a routing table by constructing a shortest-path tree with the router at the root of the tree. OSPF is a dynamic routing protocol; i.e., OSPF detects changes in network topology and recalculates paths based on the new topology. Typically, all routers in an autonomous network run the OSPF protocol simultaneously.

As further described in column 1, paragraphs 5-6, of Crawley, OSPF allows multiple networks and routers to be grouped together. These groupings are commonly referred to as areas. A summary of the area is transmitted to other areas. Since a router may be connected to more than one area, each router that borders multiple areas maintains a separate topology database for each area. OSPF provides link state advertisements (LSAs) for describing the local state of a router or network. Each LSA is flooded (or broadcast) throughout the area. The topology database is generated and maintained using the data contained in the LSAs.

To the contrary, as described in paragraph 0018 of the claimed invention, some protocols maintain state information at the nodes involved in a group communication session. The invention provides group communication by fully encoding communication trees at the sender to allow stateless operation. One of the advantages of stateless group

communication comes from reducing the signaling of the control path. The second is the added flexibility of dynamic modification of communication trees.

As further described in paragraph 0023 of the claimed invention, in order to perform application level forwarding without maintaining group communication states at intermediate nodes participating in the forwarding, the full distribution tree is encoded at the sender and included in each transmitted packet.

Accordingly, Appellants submit that Crawley does not teach "stateless" group communication. Instead, Crawley discloses "stateful" group communication, wherein each node/router within the network includes information regarding the node/router topology of the network. Therefore, it is Appellants' position that Crawley fails to disclose the claimed features "wherein said nodes in said distribution tree lack group state information" as defined in independent claims 1, 8, and 21. In view of the foregoing, the Board is respectfully requested to reconsider and withdraw these rejections.

b. Dependent Claims 28, 29, and 31

Appellants traverse the rejections because Crawley fails to disclose the claimed features "wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees" as defined in dependent claims 28, 29, and 31. As described above, Crawley does not teach or suggest "stateless" group communication. Instead, Crawley teaches "stateful" group communication, wherein each node/router within the network includes information regarding the node/router topology of the network.

Therefore, because the nodes/routers in Crawley maintain group state information (in databases describing the network topology), it is Appellants' position that Crawley teaches away from the claimed features "wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees" as defined in dependent claims 28, 29, and 31. In view of the foregoing, the Board is respectfully requested to reconsider and withdraw this rejection.

c. Dependent Claims 6, 13, and 26

Appellants traverse the rejections because Crawley fails to disclose the claimed features of "creating said distribution tree at a sender node based upon a dynamic group of receiver nodes" as defined in dependent claims 6, 13, and 26.

The Office Action asserts that such features are disclosed in column 10, lines 56-59, of Crawley (Office Action, p. 8, last para.). Appellants respectfully disagree and submit that nothing within Crawley, including the portions cited by the Office Action, discloses creating a distribution tree based upon "a dynamic group of receiver nodes" (dependent claims 6, 13, and 26).

Instead, Crawley teaches calculating a path of routers "based on information contained in the link resource advertisements and resource reservation advertisements" in the nodes (Crawley, col. 5, para. 3). However, nothing within Crawley mentions that such nodes are "dynamic".

As described in the Abstract of Crawley, a system is provided for quality of service routing functions in a connectionless network having multiple nodes. The system generates a link resource advertisement for each node in the network. Each link resource advertisement includes information regarding link resources available on a particular node in the network. The system also generates resource reservation advertisements for each node in the network. Each resource reservation advertisement includes information regarding a particular node's current reservations for a data flow. Network paths are calculated in response to a quality of service request. The calculations are performed based on information contained in the link resource advertisements and resource reservation advertisements. Nevertheless, Appellants submit that nothing within Crawley mentions that the nodes containing such "advertisements" are "dynamic".

Accordingly, Appellants submit that Crawley does not create a distribution tree based upon a dynamic group of receiver nodes. Instead, Crawley calculates a path of routers "based on information contained in the link resource advertisements and resource reservation advertisements" in the nodes (Crawley, col. 5, para. 3). However, nothing within Crawley mentions that such nodes are "dynamic". Therefore, it is Appellants

position that Crawley fails to disclose the claimed features of "creating said distribution tree at a sender node based upon a dynamic group of receiver nodes" as defined in dependent claims 6, 13, and 26. In view of the foregoing, the Board is respectfully requested to reconsider and withdraw this rejection.

d. Dependent Claims 4, 5, 7, 11, 12, 14, 24, 25, and 27

It is Appellants' position that Crawley does not disclose the features of independent claims 1, 8, and 21 and similarly does not disclose the features of dependent claims 4, 5, 7, 11, 12, 14, 24, 25, and 27. In view the foregoing, the Board is respectfully requested to reconsider and withdraw this rejection.

E. The Rejection Based on Crawley and Mittra

1. The Position in the Office Action

Claims 3, 10, 15, 17-20, 23 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawley et al. (Patent no.: US 5,995,503) in view of Mittra (Patent no.: US 5,748,736).

With respect to claim 3, Crawley teaches all the claimed limitations except that he does not explicitly teach a method of decoding a portion of the distribution tree and re-encoding the distribution tree.

In the same field of endeavor, Mittra teaches a method of decoding a portion of the distribution tree and re-encoding the distribution tree (Mittra, col. 14, lines 11-19).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to incorporate the method of decoding a portion of the distribution tree and re-encoding the distribution tree as taught by Mittra in Crawley's invention with motivation being that it provides a stronger encryption algorithm in encoding the data transmission of the distribution tree.

With respect to claim 10, the limitations of this claim are substantially the same as those in claim 3. Therefore the same rationale for rejecting claim 3 is used to reject claim 10. By this rationale claim 10 is rejected.

With respect to claim 15, Crawley teaches a method of stateless group communication of data packets to nodes in a distribution tree (Crawley, figures 11 and 12), said method comprising:

encoding said distribution tree to produce an encoded distribution tree (Crawley, col. 10, lines 48-60 and col. 11, lines 1-8, noted that distribution tree is encoded);

creating a header including said encoded distribution tree (Crawley, col. 10, lines 38-60, noted that an Explicit Routing Advertisement (ERA) header); and

adding said header to a data packet to be distributed to said distribution tree (Crawley, fig. 11, col. 10, lines 38-45, noted that ERA header is encapsulated in the ERA 252 information),

wherein said nodes in said distribution tree lack group state information (Crawley: abstract, col. 1, lines 12-29, and col. 2, lines 34-45),

modify said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree (Crawley, col. 10 lines 30-37, and col. 11 line 61 to col. 12 line 8, noted that the ERA header is constructed by traversing the tree and it is used to remove the routing information).

However, Crawley does not explicitly teach a method of decoding a portion of the distribution tree and re-encoding the distribution tree.

In the same field of endeavor, Mittra teaches a method of decoding a portion of the distribution tree and re-encoding the distribution tree (Mittra, col. 14, lines 11-19).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to incorporate the method of decoding a portion of the distribution tree and re-encoding the distribution tree as taught by Mittra in Crawley's invention with motivation being that it provides a stronger encryption algorithm in encoding the data transmission of the distribution tree.

With respect to claim 17, Crawley teaches the method in claim 15, wherein said distribution tree controls the order in which said nodes receive said data packets (Crawley, col. 10, line 61 to col. 11, line 8, noted that the node is constructed in order).

With respect to claim 18, Crawley teaches the method in claim 17, wherein by controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt (Crawley, col. 11, lines 3-15, noted that the first hop router performs the path calculations).

With respect to claim 19, Crawley teaches the method in c1aim 15, further comprising, prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes (Crawley, col. 10, lines 56-59).

With respect to claim 20, Crawley teaches the method in claim 15, wherein said encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree (Crawley, col. 11, lines 1-8, noted that the routers are arranged in sequentially order).

With respect to claim 23, the limitations of this claim are substantially the same as those in claim 3. Therefore the same rationale for rejecting claim 3 is used to reject claim 23. By this rationale claim 23 is rejected.

With respect to claim 30, Crawley teaches the program storage device in claim 15, wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees (Crawley: col. 1, lines 30-54).

2. Appellants' Position

a. Independent Claim 15

Appellants traverse the rejections because the proposed combination of Crawley and Mittra fails to teach or suggest the claimed features of "creating a header including said encoded distribution tree; and adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information" as defined in independent claim 15. Such features are also defined in independent claims 1, 8, and 21 (from which claims 3, 10, 17-19, 20, and 23 depend upon). As discussed more fully in section A.2.a, above, the "ERA header" of Crawley (which the Office Action asserts teaches the "header" of the claimed invention) does not include an encoded distribution tree. Rather, the encoded distribution tree in Crawley is

positioned in the "body" of the ERA. Further unlike the claimed invention, the ERA header of Crawley is not added to a data packet to be distributed to the distribution tree. Instead, the data packets of Crawley do not require information from the ERA headers regarding the routing path. Additionally, Crawley does not teach or suggest "stateless" group communication. Instead, Crawley teaches "stateful" group communication, wherein each node/router within the network includes information regarding the node/router topology of the network.

Appellants further submit that Mittra does not teach or suggest headers that include encoded distribution tress and nodes lacking group state information (independent claim 15). Instead, Mittra is introduced by the Office Action for the limited purpose of illustrating a process of decoding and re-encoding a distribution tree (Office Action, p. 12, item 15). Nevertheless, nothing within Mittra mentions headers that are added to data packets. Moreover, the nodes of Mittra include state information regarding the other nodes, i.e., are "stateful". Specifically, as described in column 7, last paragraph, of Mittra, receivers may need to know the list of authorized senders. Further, it should be noted that the invention does not protect against traffic analysis as a method of gaining information about group membership.

Therefore, it is Appellants' position that the proposed combination of Crawley and Mittra fail to teach or suggest the claimed features of "creating a header including said encoded distribution tree; and adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information" as defined in independent claim 15. In view the foregoing, the Board is respectfully requested to reconsider and withdraw this rejection.

b. Dependent Claim 30

Appellants traverse the rejections because the proposed combination of Crawley and Mittra fails to teach or suggest the claimed features "wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees" as defined in dependent claim 30. As

discussed more fully in sections A.2.a and A.2.b, above, Crawley does not teach or suggest "stateless" group communication. Instead, Crawley teaches "stateful" group communication, wherein each node/router within the network includes information regarding the node/router topology of the network.

Furthermore, Appellants submit that Mittra does not teach or suggest nodes that "lack group state information". Instead, Mittra is introduced by the Office Action for the limited purpose of illustrating a process of decoding and re-encoding a distribution tree (Office Action, p. 12, item 15). Nevertheless, nothing within Mittra mentions nodes that "lack group state information". Instead, the nodes of Mittra include state information regarding the other nodes, i.e., are "stateful". Specifically, as described in column 7, last paragraph, of Mittra, receivers may need to know the list of authorized senders. Further, it should be noted that the invention does not protect against traffic analysis as a method of gaining information about group membership.

To the contrary, as described in paragraph 0018 of Appellants' disclosure, some protocols maintain state information at the nodes involved in a group communication session. However, the invention provides group communication by fully encoding communication trees at the sender to allow stateless operation. One of the advantages of stateless group communication comes from reducing the signaling of the control path. The second is the added flexibility of dynamic modification of communication trees.

Accordingly, Appellants submit that neither Crawley nor Mittra teach or suggest nodes that lack group state information. Instead, the nodes of Crawley and Mittra include state information regarding the other nodes, i.e., are "stateful". Therefore, it is Appellants' position that the proposed combination of Crawley and Mittra fails to teach or suggest the claimed features "wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees" as defined in dependent claim 30. In view the foregoing, the Board is respectfully requested to reconsider and withdraw this rejection.

c. Dependent Claims 3, 10, 17-19, 20, and 23

It is Appellants' position that the proposed combination of Crawley and Mittra does not render obvious independent claims 1, 8, 15, and 21 and similarly does not render obvious dependent claims 3, 10, 17-19, 20, and 23. In view the foregoing, the Board is respectfully requested to reconsider and withdraw this rejection.

F. CONCLUSION

In view the forgoing, the Board is respectfully requested to reconsider and withdraw the rejections of claims 1, 3-8,10-15, 17-21, and 23-31.

Please charge any deficiencies and credit any overpayments to Attorney's Deposit Account Number 50-0510.

Respectfully submitted,

Date: March 31, 2008

/Duane N. Moore/
Duane N. Moore, Esq.
Registration No. 53,352

Gibb & Rahman, LLC
2568-A Riva Road, Suite 304
Annapolis, MD, 21401
Voice: (410) 573-6501
Fax: (301) 261-8825
Customer No. 29154

IX. CLAIMS APPENDIX

1. A method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree, said method comprising:

encoding said distribution tree to produce an encoded distribution tree;

creating a header including said encoded distribution tree;

adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information; and

modifying said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree.

2. (Cancelled).

3. The method according to claim 1, all the limitations of which are incorporated herein by reference, further comprising decoding a portion of said encoded distribution tree as a node receives said data packet and re-encoding said encoded distribution tree as said node passes said data packet to another node down said distribution tree.

4. The method according to claim 1, all the limitations of which are incorporated herein by reference, wherein said distribution tree controls the order in which said nodes receive said data packets.

5. The method according to claim 4, all the limitations of which are incorporated herein by reference, wherein by controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt.

6. The method according to claim 1, all the limitations of which are incorporated herein by reference, further comprising, prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes.

7. The method according to claim 1, all the limitations of which are incorporated herein by reference, wherein said encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree.

8. A method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree, said method comprising:

encoding said distribution tree to produce an encoded distribution tree;

creating a header including said encoded distribution tree;

adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information;

processing said encoded distribution tree at each node of said nodes, thereby indicating to which node of said nodes said data packet should be next transferred; and

modifying said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree.

9. (Cancelled).

10. The method according to claim 8, all the limitations of which are incorporated herein by reference, further comprising decoding a portion of said encoded distribution tree as a node receives said data packet and re-encoding said encoded distribution tree as said node passes said data packet to another node down said distribution tree.

11. The method according to claim 8, all the limitations of which are incorporated herein by reference, wherein said distribution tree controls the order in which said nodes receive said data packets.

12. The method according to claim 11, all the limitations of which are incorporated herein by reference, wherein by controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt.

13. The method according to claim 8, all the limitations of which are incorporated herein by reference, further comprising, prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes.

14. The method according to claim 8, all the limitations of which are incorporated herein by reference, wherein said encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree.

15. A method of stateless group communication of data packets to nodes in a distribution tree, said method comprising:

encoding said distribution tree to produce an encoded distribution tree;

creating a header including said encoded distribution tree; and

adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information;

decoding a portion of said encoded distribution tree as a node of said nodes receives said data packet; and

re-encoding said encoded distribution tree as said node passes said data packet to another node of said nodes down said distribution tree,

wherein said decoding and said re-encoding modify said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree.

16. (Cancelled).

17. The method according to claim 15, all the limitations of which are incorporated herein by reference, wherein said distribution tree controls the order in which said nodes receive said data packets.

18. The method according to claim 17, all the limitations of which are incorporated herein by reference, wherein by controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt.

19. The method according to claim 15, all the limitations of which are incorporated herein by reference, further comprising, prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes.

20. The method according to claim 15, all the limitations of which are incorporated herein by reference, wherein said encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree.

21. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform a method of establishing transmission headers for stateless group communication of data packets to nodes in a distribution tree, said method comprising:

encoding said distribution tree to produce an encoded distribution tree;

creating a header including said encoded distribution tree;

adding said header to a data packet to be distributed to said distribution tree, wherein said nodes in said distribution tree lack group state information; and

modifying said header as said data packet is distributed down said distribution tree to remove encoded information concerning upper distribution levels of said distribution tree.

22. (Cancelled).

23. The program storage device according to claim 21, all the limitations of which are incorporated herein by reference, wherein said method further comprises decoding a portion of said encoded distribution tree as a node receives said data packet and re-encoding said encoded distribution tree as said node passes said data packet to another node down said distribution tree.

24. The program storage device according to claim 21, all the limitations of which are incorporated herein by reference, wherein said distribution tree controls the order in which said nodes receive said data packets.

25. The program storage device according to claim 24, all the limitations of which are incorporated herein by reference, wherein by controlling the order in which said nodes receive said data packets, said encoded distribution tree permits said nodes to process said data packets upon receipt.

26. The program storage device according to claim 21, all the limitations of which are incorporated herein by reference, wherein said method further comprises, prior to said encoding process, creating said distribution tree at a sender node based upon a dynamic group of receiver nodes.

27. The program storage device according to claim 21, all the limitations of which are incorporated herein by reference, wherein said encoding comprises sequentially entering addresses of nodes during a per-level traversal of said distribution tree starting from the root of said distribution tree.

28. The method according to claim 1, all the limitations of which are incorporated herein by reference, wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees.

29. The method according to claim 8, all the limitations of which are incorporated herein by reference, wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees.

30. The method according to claim 15, all the limitations of which are incorporated herein by reference, wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees.

31. The program storage device according to claim 21, all the limitations of which are incorporated herein by reference, wherein said lack of said group state information reduces a signaling of a control path and adds flexibility of dynamic modification of said communication trees.

X. EVIDENCE APPENDIX

There is no other evidence known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.

XI. RELATED PROCEEDINGS APPENDIX

There is no other related proceedings known to Appellants, Appellants' legal representative or Assignee which would directly affect or be directly affected by or have a bearing on the Board's decision in this appeal.